

REMARKS

Claims 32-60 remain in this application. Claims 32-33 and 43-45 have been amended. Claims 53-60 have been added. No claims have been cancelled. The Applicants respectfully request reconsideration of this application in view of the above amendments and the following remarks.

35 U.S.C. §103(a) Rejection – Armani and Chan

The Examiner has rejected claims 32-52 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application No. 2004/0179573 A1 issued to Armani et al. (hereinafter "Armani") in view of U.S. Patent No. 6,236,060 issued to Chan (hereinafter "Chan"). Without admitting the appropriateness of combining Armani and Chan, the Applicants respectfully submit that the present claims are allowable over any possible combination of Armani and Chan.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

As amended, **claim 32** recites an apparatus comprising "*a silicon substrate; a microresonator disposed on the silicon substrate, the microresonator having an annular structure to recirculate light at a desired wavelength, the microresonator including one or more of nanocrystals in a matrix; and a pump disposed vertical relative to the microresonator to excite recirculation of light in the microresonator*".

Any possible combination of Armani and Chan do not teach or suggest these limitations. In particular, Chan does not teach or suggest pumps for microresonators. Armani discloses a pump 420 in Fig. 4 but does not teach or suggest that the pump is vertical relative to the microresonator. There are potential advantages to including a pump vertical relative to a microresonator. As discussed in the patent application in paragraph [0016], a vertical direction may allow for greater control of the amount of coupling by allowing adjustment of film thickness versus horizontal coupling where the coupling distance may be affected by the lithographic process. Accordingly, any possible combination of Armani and Chan does not teach or suggest the limitations of claim 32. For at least this reason, claim 32 and its dependent claims are believed to be allowable.

As amended, claim 45 recites an apparatus comprising *"a silicon substrate; a microresonator disposed on the silicon substrate, the microresonator having an annular structure to recirculate light at a desired wavelength, wherein the microresonator includes silicon nanocrystals, silicon-germanium nanocrystals, or a combination thereof; and a patterned waveguide disposed vertically relative to and optically coupled with the microresonator"*.

Any possible combination of Armani and Chan do not teach or suggest these limitations. In particular, Chan does not teach or suggest a waveguide coupled with a microresonator, let alone a patterned waveguide or a waveguide disposed vertically relative to the microresonator. Armani discusses fiber waveguides, perferably tapered fiber waveguides (see e.g., paragraph [0047]). However, fiber waveguides are not **patterned** waveguides. Patterned waveguide are well known to be formed by patterning layers formed over a substrate. Furthermore, Armani does not teach or suggest that the waveguide is disposed **vertically** relative to the microresonator. There are potential advantages to including waveguide disposed vertical relative to a microresonator. See e.g., paragraph [0016] of the present patent application. Accordingly, any possible combination of Armani and Chan does not teach or suggest the limitations of claim 45. For at least this reason, claim 45 and its dependent claims are believed to be allowable.

As amended, claim 57 recites an apparatus comprising *"a silicon substrate; a microresonator disposed on the silicon substrate, the microresonator having an annular structure to recirculate light at a wavelength, the microresonator including nanocrystals in an Al-SiO_x matrix; and a patterned waveguide optically coupled with the microresonator"*.

Any possible combination of Armani and Chan do not teach or suggest these limitations. In particular, neither Armani nor Chan teach or suggest either: (a) an Al-SiO_x matrix; or (b) a patterned waveguide optically coupled with the microresonator. Accordingly, any possible combination of Armani and Chan does not teach or suggest the limitations of claim 57. For at least this reason, claim 57 and its dependent claims are believed to be allowable.

Double Patenting

The Examiner has provisionally rejected claims 32-34, 36-46, and 48-52 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-20 of copending U.S. Patent Application No. 11/121,580 (US 2005/0226564).

Applicants will consider filing a Terminal Disclaimer at a later date.

Conclusion

In view of the foregoing, it is believed that all claims now pending patentably define the subject invention over the prior art of record and are in condition for allowance. Applicants respectfully request that the rejections be withdrawn and the claims be allowed at the earliest possible date.

Request for Telephone Interview

The Examiner is invited to call Brent E. Vecchia at (303) 740-1980 if there remains any issue with allowance of the case.

Request For An Extension Of Time

The Applicants respectfully petition for an extension of time to respond to the outstanding Office Action pursuant to 37 C.F.R. § 1.136(a) should one be necessary. Please charge our Deposit Account No. 02-2666 to cover the necessary fee under 37 C.F.R. § 1.17 for such an extension.

Charge Our Deposit Account

Please charge any shortage to our Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

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Brent E. Vecchia

Brent E. Vecchia
Reg. No. 48,011

12400 Wilshire Boulevard
Seventh Floor
Los Angeles, California 90025-1030

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